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AUTHOR McCord, Joan
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ABSTRACT

A Drexel University survey of faculty determined their experience with computers, knowledge of various computer languages, and attitudes about a new policy requiring students' use of microcomputers. Questionnaire responses were obtained from 328 full-time faculty and 222 part-time faculty. For 15 possible ways of using computers, only a minority of the faculty reported having extensive experience, and for every discipline, younger faculty had more computer experience. Both full- and part-time faculty were more likely to have used computers for numerical computations than for word processing, data analyses, literature search, or playing computer games. A higher proportion of full- than part-time faculty had computer experience. Computers were used by over 50 percent of the engineering and science faculty. While 45 percent of the business administration faculty had extensive computer experience, 42 percent had no experience. Engineering/science faculty were more likely to have written programs in high-level languages than to have used software packages, while business faculty were more likely to have used software. Faculty were more likely to have used a mainframe computer than a microcomputer. The views of faculty about a new requirement that freshmen own a microcomputer were also assessed. (SW)

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Joan McCord
Department of Psychology and Sociology
Drexel University

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Director, Microcomputing Program, Drexel University
32nd and Chestnut Streets, Philadelphia, PA 19104
(215) 895-2203

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Joan McCord
Department of Psychology and Sociology
Drexel University

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FACULTY AT THE THRESHOLD[1]

Many professors attended graduate school in the 1940s and 1950s, at a time when few students considered computers to be anything other than tools for technicians to use. Most of the rest of the university faculties received their terminal degrees one or two decades later, when graduate students in a few fields began to be trained to use computers as tools for their own research. Then suddenly, early in the 1980s, computers became such an important part of education that several states, high schools, and colleges attached "computer literacy" to the list of basic competencies. To understand the social impact of this rapid shift in the perceived importance of training in the use of computers, faculty and students at one university are participating in a five-year study. The present report describes the beginning of that longitudinal study.

Background

Drexel University, near the center of Philadelphia, had been Drexel Institute of Technology, best known for its College of Engineering and its successful undergraduate "co-op" program. During the 1970s, Drexel expanded its curriculum and developed graduate programs. Although the university had encouraged faculty as well as students to become literate in some computer language, a committee report dated April, 1982, cited faculty ignorance about computers as a major problem.

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[1] Paper presented at the Eastern Sociological Society Annual Meeting, Boston, March 9-11, 1984.

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Only six months later, the president of Drexel announced that incoming freshmen of the following year would be required to own microcomputers. Faculty committees changed their focus from deciding how to encourage faculty understanding of computers to questions about criteria for selecting a machine. By early 1983, a contract had been signed which would enable freshmen and faculty to purchase the selected microcomputer at reduced cost. The machine itself was yet to be developed and the faculty was told only general information about its characteristics.

A month after announcement of the contract, questionnaires[2] were distributed to the faculty. The questionnaires requested information about experience with computers, knowledge of various computer languages, educational histories, teaching styles, and views about potential changes resulting from the microcomputer decision.

Responses came from 328 (92.9%) of the full-time faculty. To gain some perspective on faculty in relation to other interested parties, the questionnaire was distributed to part-time faculty, from whom 222 responses were received. Four months later, questionnaires were distributed to incoming freshmen.

Results

As the university plunged into its commitment to provide computer assisted education, many members of the faculty were caught between role expectations for leadership and realistic expectations that students would be more experienced in the use of computers. The questionnaire listed fifteen possible ways of having used computers. For each, only a minority of the faculty reported having extensive experience. As an additional potential complication for the status hierarchy, in every discipline, younger faculty had more experience using computers.

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[2] Questionnaire available from Prof. Joan McCord, Department of Psychology and Sociology, Drexel University, 32nd and Chestnut Streets, Philadelphia, PA 19104.

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Both full-time and part-time faculty were more likely to have used computers for numerical computations than for word processing, data analyses, literature search, or playing computer games. Computer games, commonly believed to be a bridge to more sophisticated uses, had been played by only 10% of the faculty.

Overall, a higher proportion of full-time faculty than of part-time faculty reported experience with computers. Full-time faculty had a statistically reliable edge (using chi-square, $p<.05$, as criterion) with using computers to make literature searches, reading printouts, using data analysis packages, and using computer interfaces with laboratory equipment. On the other hand, part-time faculty were more likely to have used computers in doing financial analyses or accounting-type activities.

In terms of computer sophistication, the faculties of the colleges of Engineering and of Science stood apart from other faculties in the university. Over half had used computers in a variety of ways and less than one in five had little experience with them. Although these faculties were most likely to have used computers for numerical computations, about half had also read printouts and almost half had written programs in a high-level language. Engineers and scientists were relatively likely also to have used software application packages and text-processing programs.

Faculty in the College of Business and Administration divided into two distinct types. The proportion who had extensive experience (45%) was almost as large as that in the sciences and engineering faculties. In the College of Business and Administration, however, almost half (42%) had not used computers. Faculty in the College of Business and Administration where most likely to have read printouts. They were relatively likely to have used computers for numerical computations and manipulation of "data rich" bases. Whereas faculty in science and in engineering were more likely to have written programs in high-level languages than to have used software packages, faculty in the College of Business and Administration were more likely to have used software packages.

Faculty in the College of Humanities and Social Sciences were as likely as those in the College of Business and Administration to have no

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experience with computers. A much lower proportion, however, had used computers in a variety of ways. Faculty in Humanities and Social Sciences were most likely to have experience with text processing and with reading printouts.

To some extent, differences among the faculties from different colleges appear to reflect different orientations toward education. Incoming freshmen enrolled in science and in engineering were most likely to have had experience using computers. Those enrolled in social sciences and humanities were least likely to have used computers. In contrast with faculty, however, incoming students were much more likely to have played computer games than to have written programs, used data analysis packages, or worked with text processing.

The faculty was asked about familiarity with a variety of languages including Pascal, Logo, LISP, PL1, AFL, and COBOL. The part-time faculty was more likely than full-time faculty to be familiar with COBOL, and the full-time faculty was more likely to be familiar with Pascal. Both part-time and full-time faculty were most likely to have used FORTRAN. FORTRAN was considerably more popular than second-place BASIC among engineers, and slightly more popular among faculty in the College of Science and in the College of Business and Administration. Incoming freshmen, on the other hand, were most likely to be familiar with BASIC.

Even those faculty comfortable with using computers knew they would be faced with a challenge to develop new techniques if they were to match student expectations in the classroom. In each college, faculty was more likely to have used computers in research (or consulting) than in teaching. For example, in the business college, 47% of the faculty had used computers for consulting or research, but only 20% had used them in courses. Seventy percent of the engineers had used computers for research; 28% had used them for teaching.

Both full-time and part-time faculty were more likely to have used a mainframe computer than a microcomputer (or a supermini, a mini, or a supercomputer). Whereas 41% of the full-time faculty had had considerable experience using mainframe computers, only 20% had

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extensive experience with microcomputers. Part-time faculty were almost as likely as full-time faculty to have used microcomputers, although they were less likely to have used mainframes.

The decision to require freshmen of the following year to own microcomputers came as a surprise to most of the faculty. The faculty questionnaire asked respondents to identify their initial reaction to the announcement. According to their reports, on the whole, the faculty reacted favorably. A majority in each college said they were either "delighted" or "relatively pleased" (with alternatives being "neutral", "worried", or "very upset").

Despite the apparent similarities between the colleges of Engineering and of Science in terms of their experiences with computers, faculty in the two colleges differed in their responses to the policy announcement. Engineers were most likely to report having been pleased, whereas the natural scientists were least likely to report having been pleased. Only among humanities and social science faculty were attitudes toward the decision systematically related to having experience using computers: A higher proportion of those who had used computers were pleased with the new policy.

Reporting on their current attitudes, about a month after the announcement, differences among the colleges had diminished. With the exception of engineers, faculty who had little experience with computers tended to report having fewer current worries than when the announcement first was made.

The faculty was asked: "As a result of the microcomputer decision, what changes do you foresee among students?" Over half the full-time faculty mentioned an impact on interests or reasoning. Over a quarter suggested that students were likely to become more efficient, productive, logical, or creative. About 12% anticipated such negative effects as reduced ability to deal with concepts, increased anxieties, or decreased verbal skills. Among those who mentioned changes, faculty in the College of Humanities and Social Sciences were most likely to anticipate positive changes in students' reasoning; faculty in the College of Science were most likely to

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anticipate negative changes.

The faculty was asked: "What changes do you foresee for yourself?" Forty-two percent of the experienced and 44% of the inexperienced members of the faculty mentioned benefits such as increased productivity (mentioned especially among faculty in Humanities and Social Sciences) and increased teaching effectiveness (mentioned especially among faculties in the College of Business and Administration, Science, and Engineering).

Intensive programs for faculty development began shortly after the announcement that Drexel would require students to own computers. Faculty could take courses in programming languages, use of software, data manipulation, and word-processing. Faculty could also apply for released time to revise courses, for research assistants to write programs, and for money to travel or consult at other universities. A majority of the faculty took advantage of these opportunities. The proportion who did ranged from a high of 77% in the business college to a low among engineers of 42%.

Neither attitude toward the computer decision nor prior use of computers explained participation in the faculty development projects. Not only were differences in participation within colleges unrelated to experience using computers, but also participation rates were unrelated to tenure or to length of time at Drexel.

Faculty had been asked to "rank in order of importance what emphasis you believe Drexel faculty should place" on preparing students to be successful in their careers, improving the way students reason, providing general education, communicating knowledge in specialized fields, producing knowledge, and teaching an appreciation for knowledge. Members of the faculty who gave priority to research and to training for career success were most likely to be pleased with the decision that required student ownership of computers. Those who most highly valued providing general education were most likely to have participated in the faculty development program. That is, participation in the faculty development program seems to have reflected commitment to broad

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education rather than to the numerical or computational emphasis that had been represented by prior computer use.

Summary

This paper reports on the beginning of a longitudinal study in a university where widespread use of microcomputers involves re-education of many members of the faculty. The initial survey showed that about half the faculty was unacquainted with computers. As might have been expected, scientists and engineers were most likely to have experience with computers, although only a minority among them had used computers in teaching. "Inexperienced" faculty was disproportionally found in the College of Humanities and Social Sciences where, more than elsewhere in the University, the technological revolution can be expected to take its toll or make its contribution.

The faculty was more likely to be familiar with the older language of FORTRAN than with any of the newer languages, and more likely to have experience with mainframe computers than with the more recently developed microcomputers. Thus, even among faculty with veteran credentials, re-education can be anticipated. Re-education had begun, for a majority of the faculty, prior to arrival of computers on campus.

Optimism about the effects of requiring computer ownership was not tied to having experience with computers, nor was it restricted to those who teach in quantitative fields. Rather, the faculty seems willing to withhold judgments about the possible impact of computer proliferation in a university setting. The five-year project will provide some measurement of that impact.

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